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Disaster Management: The Standards Perspective

ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management

AI: AI for Natural Disaster Management
ITU Focus Group

WMO

UN environment programme

ITU

Acknowledgements

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Additional information and material related to this Report are available at: https://www.itu.int/en/ITU-T/focusgroups/ai4ndm/Pages/default.aspx.

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Preface – WMO

In recent decades, the increasing frequency and intensity of natural hazards have highlighted the urgent need for innovative solutions to mitigate their devastating impacts. As the specialised UN agency for weather, climate, and water, the World Meteorological Organization (WMO) recognizes the challenges these phenomena present and the critical need for timely and accurate information in disaster mitigation, preparedness, management, response, and recovery. Artificial Intelligence (AI) offers unprecedented opportunities to generate and quality control date, enhance our predictive capabilities, optimize resource allocation, and improve communication during emergencies. It is my honour to co-present this report which showcases the collaborative effort on standardization by the ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management (FG-AI4NDM). This report stands as a testament to the power of international cooperation and the transformative potential of advanced technologies in bolstering our resilience against natural hazards. AI can also speed up and scale our efforts to achieve the 2030 Agenda for Sustainable Development and the Sustainable Development Goals.

The work of FG-AI4NDM, which commenced in December 2020, explored the diverse applications of AI and other emerging technologies throughout the disaster management cycle. It demonstrates how AI can improve risk assessment, enable precise forecasting, facilitate real-time monitoring, and support efficient recovery efforts. By harnessing AI, we can transform vast amounts of meteorological and hydrological data into actionable insights, thereby enhancing decision-making processes and ultimately saving lives and protecting livelihoods, including the most vulnerable to climate change.

Each organization has contributed unique expertise: WMO its profound understanding of meteorology, climatology, and hydrology, ITU its leadership in digital technologies and standards; and UNEP its focus on environmental sustainability. Together, we have developed a comprehensive framework for AI applications in disaster management, addressing key issues such as data privacy, algorithmic biases, and the necessity for high-quality data. These activities have not only fostered innovation but also built a global network of experts committed to enhancing disaster resilience through AI.

Looking ahead, it is crucial that we continue to build on this foundation by promoting the adoption of international standards for disaster management. The outcomes of FG-AI4NDM are also anticipated to contribute to achieve the goals of the global Early Warnings for All (EW4All) initiative and the WMO Working Group on Digital Transformation for Hydrology and Water Resources, which aims to better manage water and climate related hazards and ensure sustainable water management across all regions.

Ongoing collaboration among scientists, practitioners, policymakers, and technology developers is essential for developing a more resilient and effective approaches to disaster management and building on the profound achievements of the FG-AI4NDM. I look forward to continuing this cooperation to build a more resilient world for all.

Ko Barrett
Deputy Secretary General, World Meteorological Organization

Foreword – ITU

Breakthroughs in science and technology are creating unprecedented capabilities to protect our planet and the life it supports.

Satellite imagery, for example, is the largest source of data on Earth's processes that we have ever had. This data can now be analysed in real time with artificial intelligence.

With new data and insight, we are gaining new powers of prediction able to save countless numbers of lives.

That is exactly the aim of our partnership with the World Meteorological Organization and the United Nations Environment Programme.

Our focus group analysed promising applications of AI for disaster management, curated 27 use cases, and laid the groundwork for new international standards.

Its studies explored AI-enabled advances in data collection and handling, the modelling of natural hazards and disasters, and emergency communications.

Our focus group's standardization roadmap and glossary of terms and definitions are of key importance to coordinated global action on disaster risk reduction.

The group also developed guidance on curating data sets for AI, the training and evaluation of AI-based models, and integrating AI into disaster-management tools.

This report is essential reading for everyone interested in contributing to the next phase of international collaboration on disaster risk reduction.

This next phase will be anchored by our new Global Initiative on Resilience to Natural Hazards through AI Solutions together with WMO, UNEP, the UN Framework Convention on Climate Change, and the Universal Postal Union.

We will continue exploring AI use cases and driving associated research, innovation, and standards development. We also plan to create an AI readiness framework to assess and improve national capacities for using AI in disaster management.

We welcome you to join us.

Seizo Onoe
Director, Telecommunication Standardization Bureau (TSB)
International Telecommunication Union (ITU)

Abbreviations and Acronyms

AI	Artificial Intelligence
DRR	Disaster Risk Reduction
FG	Focus Group
FG-AI4NDM	Focus Group on AI for Natural Disaster Management
GIS	Geographic Information Systems
IoT	Internet of Things
ITU	International Telecommunication Union
NLP	Natural Language Processing
SDGs	Sustainable Development Goals
SDO	Standards Development Organizations
TG	Topic Group
UAV	Unmanned Aerial Vehicle
UMBC	University of Maryland, Baltimore County
UN	United Nations
UNEP	United Nations Environment Programme
WG	Working Group
WMO	World Meteorological Organization

Executive Summary

The Report highlights the collaborative efforts of the International Telecommunication Union (ITU), World Meteorological Organization (WMO), and United Nations Environment Programme (UNEP) in advancing the use of Artificial Intelligence (AI) for natural hazard management through the Focus Group on AI for Natural Disaster Management (FG-AI4NDM). This Focus Group aims to strengthen global disaster resilience by establishing best practices and frameworks for applying AI technologies to predict, respond to, and recover from natural hazards.

With the increasing frequency and severity of disasters, the integration of AI has become essential tool across the disaster management cycle, from mitigation and preparedness to response and recovery. AI can be leveraged to forecast disasters, assess risks, and optimize resource allocation. However, challenges such as data privacy, algorithmic biases, and the need for specialized expertise underscore the importance of international standards to ensure the reliability, transparency and acceptability of AI systems.

FG-AI4NDM has made significant strides through its activities, including the development of a glossary of over 500 terms to provide insights into disaster management terminology and a Standards Roadmap to identify key gaps. The group has also produced three key reports focusing on AI applications for data management, spatiotemporal modeling, and communication systems. These reports provide best practices for managing data, modeling disaster scenarios, and implementing AI-driven communication solutions. Additionally, FG-AI4NDM has organized a series of meetings, workshops, and hackathons to foster collaboration on the use of AI applications for disaster management, which have been crucial for refining strategies and addressing challenges.

There continues to be the need for international cooperation and the development of standards to enhance disaster preparedness and resilience to ensure improved data flow, coordination, and integration of emerging technologies to mitigate the impact of disasters. To further build on the outcomes of FG-AI4NDM and to drive further standardization, the Global Initiative on Resilience to Natural Hazards through AI Solutions was announced during the AI for Good Global Summit in 2024 in Geneva, Switzerland.

Background

More than 125 million people were affected by disasters each year globally between 2015-2023.[1] The rising frequency of disasters over the past five decades has significantly heightened concerns about potential further loss of life and property. The adoption of Artificial Intelligence (AI) in managing these natural hazards has seen considerable growth over the years, propelled by enhanced computing capabilities, data access, and refined algorithms. Initial efforts concentrated on crafting basic models for predicting meteorological conditions and natural events such as earthquakes and floods. The introduction of big data, machine learning, and deep learning technologies has broadened the scope of application, allowing for more holistic approaches to disaster management in line with the targets of the Sendai Framework for Disaster Risk Reduction.

AI is applied across a spectrum of activities, ranging from forecasting disasters and evaluating risks to conducting real-time surveillance, and aiding in recovery after a disaster. AI-based modelling techniques can also be employed to process extensive datasets on weather and geological conditions to forecast potential natural hazards like floods, earthquakes tsunamis and landslides, thereby facilitating timely evacuations. Additionally, AI-enhanced imagery and video analysis from satellites and drones help in the immediate monitoring of disaster-stricken zones, which aids in swift damage evaluation as well as in resource prioritization and distribution. Incorporating AI into disaster management comes with its own set of challenges. Concerns about data privacy, biases in algorithms, and the necessity for comprehensive, high-quality data are prominent. Furthermore, the effective utilization of AI solutions demands specialized knowledge, which may pose barriers.

International standards can facilitate the smooth integration of various AI technologies, improving the efficiency of disaster response and mitigation activities. They help ensure data privacy and safeguard AI systems against cyber threats, preserving their dependability in emergency situations and transparency in decision-making. By setting best practices, global standards direct the creation and application of AI tools, making sure they are strong, equitable, and effective in handling natural hazards. Standards can also support the advancement in AI technologies, while serving as a link between technological innovation and humanitarian efforts, presenting new opportunities to lessen the harsh effects of natural hazards and disasters.

The cooperative efforts of the World Meteorological Organization (WMO), the International Telecommunication Union (ITU), and the United Nations Environment Programme (UNEP) can play a key role in formulating standards for managing natural hazards, thereby boosting worldwide resilience and response abilities. Each of these United Nations agencies contributes critical knowledge and expertise—WMO with its meteorological insights, climatological and hydrological, UNEP with its understanding of environmental risks and ITU serves as both a standards developing organization (SDO) and the UN agency for digital technologies—all of which are vital for the development of a comprehensive and interoperable frameworks, guidelines and best practices for disaster management.

In line with this vision, the ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management (FG-AI4NDM) was established in December 2020.

[1] https://www.undrr.org/implementing-sendai-framework/monitoring-sendai-framework

This report aims to:

- Highlight the important role that AI can play across the different phases of disaster management
- Promote a common understanding on the use of different terminologies related to disaster management through the Glossary prepared by FG-AI4NDM
- Underscore how standardization can facilitate a uniform and interoperable approach to the adoption of AI and other technologies for disaster management
- Provide a synopsis of the main meeting carried out in the context of FG-AI4NDM
- Present the outcomes of FG-AI4NDM and the need to continue standardization within this domain and technology evolves


Mitigation
Preparedness
Disaster Management
Recovery
Response

AI and the Disaster Management Cycle

AI and other advanced technologies can play a pivotal role across the disaster management cycle: Their deployment greatly improves the capabilities to forecast, handle, and recover from various disaster types.

1. ***Mitigation***

   During this phase, AI and innovative technologies are applied to evaluate risks and project possible disaster scenarios. Through historical and real-time data from multiple sources including sensors and satellites are analyzed to detect patterns that may predict natural hazards like earthquakes, floods, or wildfires. Tools such as Geographic Information Systems (GIS) and remote sensing data are crucial in identifying high-risk zones which helps in the formulation of disaster risk reduction (DRR) strategies.

2. ***Preparedness***

   In this phase, AI enhances the development of forecasting and monitoring systems. Predictive analytics utilize data to anticipate disasters, enabling timely warnings and the efficient mobilization of resources. Technologies like virtual and augmented reality offer realistic training environments for emergency personnel, improving their preparedness for actual emergencies.

3. ***Response***

   AI coupled with other emerging technologies can support the expediting of actions during the response phase. Drones, powered by AI, are deployed swiftly to survey damage, pinpoint survivors, and distribute supplies to hard-to-reach locations. AI-enhanced analytics optimize the distribution of resources and logistics to ensure rapid assistance. Tools based on Natural Language Processing (NLP) evaluate real-time data from social media and other communication streams for up-to-date situational insights; meanwhile, AI chatbots and virtual assistants support the coordination of response efforts and information dissemination to the public.

4. ***Recovery***

   During the recovery stage, AI is instrumental in assessing damage and supporting the rebuilding process. Technologies for image recognition analyse structural damages, and AI-supported decision-making systems facilitate the effective allocation of reconstruction resources. Data analytics monitor the progress of recovery efforts, highlighting areas that require additional focus. Emerging technologies like blockchain add a layer of transparency and security in managing aid distribution.

Overall, the adoption of AI and advanced technologies throughout all phases of disaster management enhances decision-making and resource management, while strengthening the community resilience against future disasters.

ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management

The ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management (FG-AI4NDM) provided a basis for standards by studying how AI can be harnessed for data collection, spatiotemporal modeling, and effective communication during disasters, with the aim of establishing best practices and frameworks within this domain.

Blueprint for Resilience: FG-AI4NDM Structure

FG-AI4NDM organized its activities through five Working Groups (WGs) and two Work Streams (WSs) and various Topic Groups feeding into their activities as shown in Figure 1. FG-AI4NDM was chaired by Ms Monique Kuglitsch (Fraunhofer HHI, Germany).

Figure 1: Working Groups of FG-AI4NDM

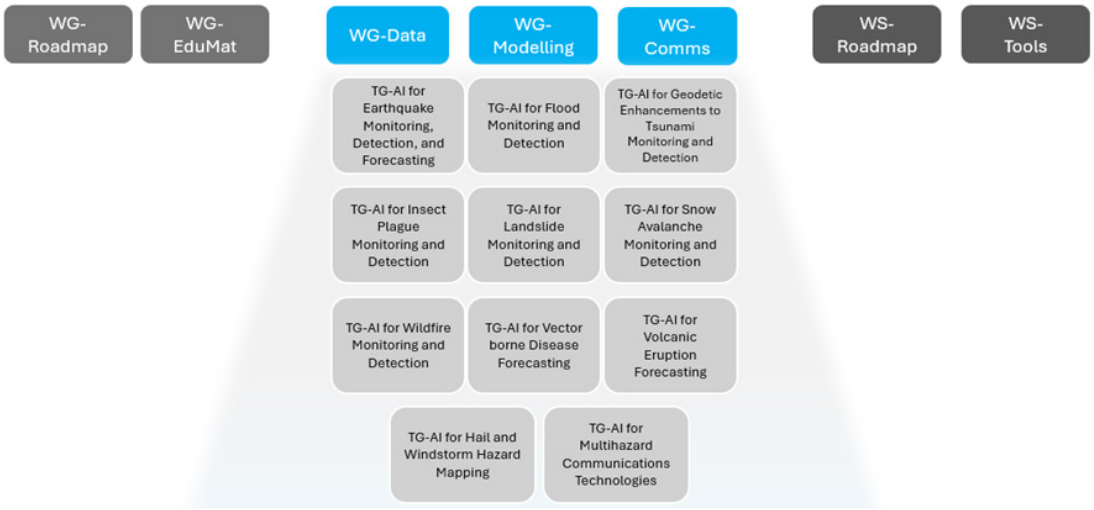
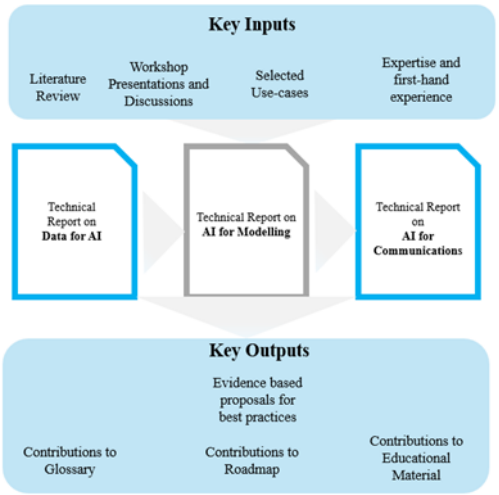


Figure 2: Linkages between the FG-AI4NDM Outputs



Key Terms in Crisis: Disaster Management Glossary

FG-AI4NDM developed a Glossary to provide clarification on complex and specialized terminologies related to disaster management to ensure that stakeholders—from researchers and policymakers to emergency responders and data analysts share a common understanding of key concepts and technologies. Containing over 500 terms and definitions, this Glossary aims to enhance communication and collaboration across diverse sectors, preventing misunderstandings and streamlining efforts.

This well-defined Glossary supports standardization by providing a foundational reference for terms, supporting the development of cohesive and interoperable frameworks. It also serves as a valuable tool for training programs, equipping professionals with the necessary knowledge to effectively utilize AI technologies.

The Landscape of Disaster Management Standards

FG-AI4NDM's Standards Roadmap compiles and analyses the standards available related to the application of AI and other technologies for dealing with natural hazards and disasters.

The Roadmap identifies key areas where standards are lacking or need refinement, guiding the development of additional comprehensive guidelines that address these gaps. It also helps with the alignment of efforts and supports the advancement of reliable and effective AI solutions for disaster management.

Figure 3: Technology types referenced in standards

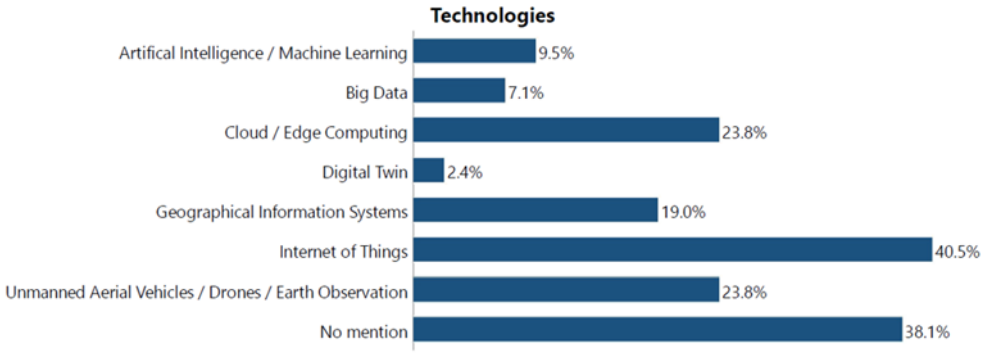
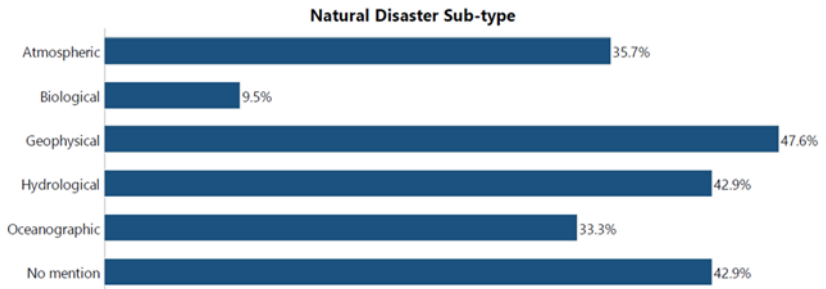


Figure 4: Disaster types referenced in standards



Pioneering Standards: FG-AI4NDM Best Practices in AI for Disaster Management

FG-AI4NDM developed three core Reports which put forth several best practices on leveraging AI for disaster management.

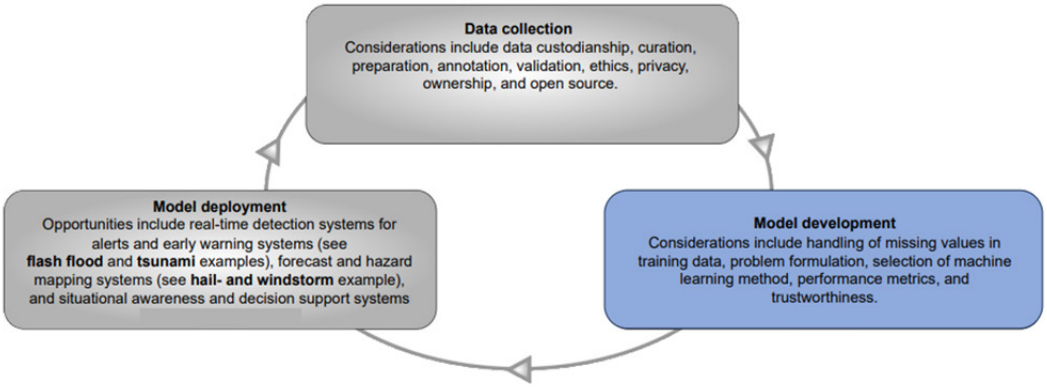
The AI for Data Report is dedicated to uncovering and defining methodologies for the comprehensive management of data for disaster risk reduction. The report emphasizes several best practices for AI/ML data-related processes in disaster management. Key practices include promoting technologies that enforce legal and ethical principles to avoid harmful outcomes, ensuring meticulous data selection and processing to maintain reliability and accuracy, and utilizing data visualization to enhance understanding and transparency of AI/ML algorithms. It also stresses the importance of managing data quality, quantity, compatibility, and appropriateness, and provides guidelines for acquiring, managing, and preparing Earth Observation (EO) data. Additionally, the report highlights the need to address data bias, standardize data through organizations like the Open Geospatial Consortium (OGC). Open data and software are encouraged to foster accessibility and collaboration, and the use of machine-learning operations (MLOps) is recommended to capture the dynamic flow of data and lifecycle management.

The AI for Modeling Report investigates how AI can enhance modeling across spatiotemporal scales by extracting complex patterns and deriving insights from increasing volumes of geospatial data for disaster risk reduction. It also focuses on key aspects such as data preparation for training, AI development, and evaluation, aiming to refine and advance AI-driven modeling techniques. The best practices for developing AI models in natural hazard management, as highlighted in the report, emphasize a context-specific evaluation approach that includes human discrimination, problem benchmarks, and peer confrontation. It is crucial to use a wide range of performance metrics such as confusion matrices and Pearson Correlation Coefficient to ensure robustness, reliability, and explainability. Additionally, addressing issues like data poisoning and ensuring the scalability and peer review of models are essential to maintain their accuracy, reliability, and usefulness in high-risk scenarios. The report also underscores the importance of involving domain experts like meteorologists and emergency responders in the testing and evaluation phases to ensure the models align with real-world needs and provide valuable insights for disaster response and recovery.

The AI for Communications Report examines how AI-based communication systems can be used before, during, and after disasters occur. This report covers various systems such as alerts, early warning, forecasts, hazard maps, decision support tools, dashboards, and chatbots. It emphasizes the importance of transparency, advocating for open-source and open-data approaches and community capacity support in co-creating machine learning projects. It suggests integrating AI into existing communication frameworks and ensuring high-quality, representative data aligned with FAIR principles. For decision support systems, it recommends seamless information sharing and multi-stakeholder coordination. For chatbots, it advises embedding them into widely used applications and considering local dialects. The report also highlights the need for standardized warning dissemination protocols, such as the common alerting protocol (CAP), to ensure effective communication. These practices aim to enhance public safety, community resilience, and the overall effectiveness of AI-based tools in disaster management. It further explores the development and implementation of these systems from both technical and social perspectives, including stakeholder involvement and ethical considerations.

FG-AI4NDM also hosted two innovative hackathons (See Appendix) and provided advanced AI training for disaster management through its Working Group on Educational Materials.

Figure 5: Simplified AI Lifecycle for DRR



FG-AI4NDM Meetings in focus

Between March 2021 to March 2024, the Focus Group has organized twelve meetings including nine virtual meetings and three on-site meetings (See Appendix). Numerous webinars and workshops co-organized by ITU, WMO, UNEP were held to foster a community of over 1000 experts, share FG-AI4NDM's work, and gather further insights and use cases on the application of AI across various types of disasters.

Figure 6: Participants at the 6th Meeting of FG-AI4NDM (June 2022)

The sixth meeting of FG-AI4NDM held from 7-9 June 2022, marked the Focus Group's inaugural on-site meeting. Held in Geneva, Switzerland, this event was hosted at the WMO in Geneva, Switzerland. This meeting helped facilitate dynamic discussions and strengthened relationships among participants.

The seventh of FG-AI4NDM and Workshop was organized from 24-26 October 2022 in Athens, Greece, hosted by the General Secretariat of Telecommunications and Posts of the Ministry of Digital Governance, Hellenic Republic. The lunch and coffee breaks, generously sponsored by the host, provided excellent opportunities for informal networking and discussion.

Figure 7: Ms Monique Kuglitsch FG-AI4NDM Chair delivering the Opening Remarks during the 7th Meeting (October 2022)

Figure 8: Panel discussion during the Workshop which preceded the 7th Meeting of FG-AI4NDM (October 2022)

The twelfth meeting of FG-AI4NDM and related Workshop were held in Catonsville, Maryland, United States NASA's Goddard Earth Systems and Technology Center (GESTAR II) and the University of Maryland, Baltimore County (UMBC) from 13-15 March 2024. To support the participation of female stakeholders and experts from least developed countries, a travel support grant was received from International Union of Geodesy and Geophysics (IUGG) (See Figure 11). During this meeting, there was a call to launch a new Initiative to expand on the outcomes of FG-AI4NDM.

On the last day of the meeting, the attendees were taken on a tour of NASA's Goddard Earth Systems (See Figure 9 and Figure 10).

Figure 9: Seizo Onoe (TSB Director, ITU) during the NASA Goddard Space Flight Centre tour (March 2024)

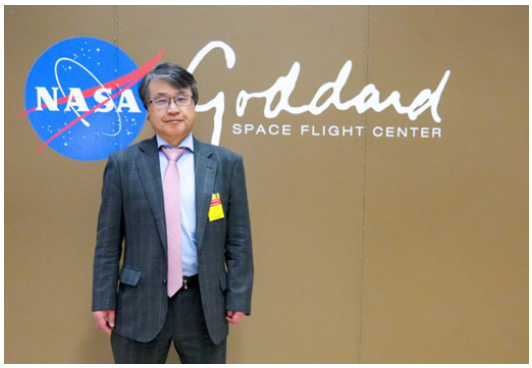


Figure 10: Tour of NASA's Quantum Lab (March 2024)

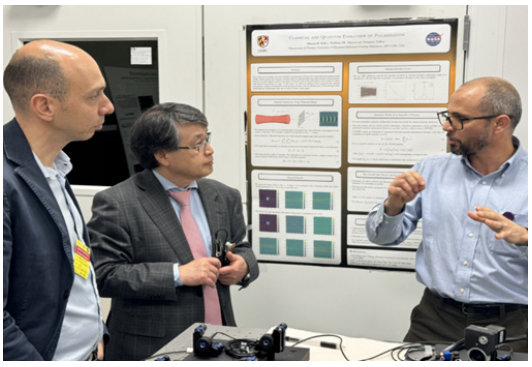


Figure 11: Experts funded by the IUGG travel grant with the FG-AI4NDM Chair

Figure 12: Golestan (Sally) Radwan, Chief Digital Officer (UNEP) delivering the Opening Remarks during the FG-AI4NDM Workshop (March 2024)

Figure 13: Participants at the FG-AI4NDM Meeting (March 2024)

Following on from the discussions during the 12th and final FG-AI4NDM meeting, the "*Global Initiative on Resilience for Natural Hazards through AI Solutions*" was announced during the AI for Good Global Summit on 30 May 2024 at the UN Leaders Roundtable Lunch – How to leverage AI in the UN in support of safe, responsible and equitable AI. In addition to the existing partners on the Focus Group, Universal Postal Union (UPU) and the United Nations Framework Convention on Climate Change (UNFCCC) have also agreed to join this new initiative. This initiative seeks to investigate and strengthen the capabilities of AI and other modern technologies in various disaster scenarios, with a focus on research, innovation, and the development of standards.

Conclusion

FG-AI4NDM has provided a solid groundwork for best practices in AI applications through its comprehensive Reports on AI for Data, Modeling and Communications, along with interactive workshops, hackathons, and training sessions. The Focus Group's dedication to enhancing disaster resilience is evident in its exploration of AI-based communication systems, the development of technical and ethical guidelines, and its efforts to promote international collaboration and standardization.

The Focus Group meetings held over the course of three years have also proved to be critical for refining strategies, addressing challenges, and advancing the effective application of AI in disaster management. Through its efforts, FG-AI4NDM has been driving innovation and supporting the development of international standards. Its role remains pivotal in leveraging AI to enhance disaster preparedness, response, and recovery and should be built on and continued by relevant partner entities. The continued collaboration among experts, policymakers, and technology developers is essential for developing a more resilient and adaptive global approach to natural hazard management.

By adopting the standards collectively developed by the UN agencies like the ones developed based on the work of FG-AI4NDM, there would be enhanced data flow, improved coordination, and the integration of emerging technologies across various systems, facilitating swift and quality controlled information and resources delivery during emergencies. This joint effort not only encourages global cooperation but also promotes the sharing of best practices and the implementation of innovative solutions, multi-hazard warning systems, ultimately improving disaster readiness, management, and recovery efforts globally, thereby reducing the impact of disasters worldwide. To foster further standardization, the Global Initiative on Resilience to Natural Hazards through AI Solutions was announced at the AI for Good Global Summit held in Geneva, Switzerland, in 2024 to build on the outcomes of FG-AI4NDM. This Global Initiative will help enhance preparedness and response to natural hazards by leveraging AI and other emerging technologies. By promoting standardization and collaboration, this initiative will drive more effective and unified and cohesive approaches to managing and mitigating the impacts of natural hazards.

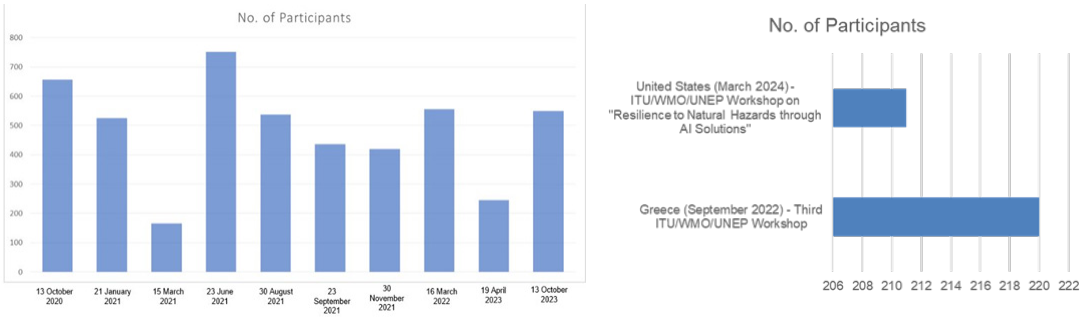
Appendix

1. List of FG-AI4NDM Meetings and Overview of Meeting Participation

Table 1: List of FG-AI4NDM Meetings

Meeting Dates	Meeting No.	Location	Hosts
16-17 March 2021	1st Meeting of FG-AI4NDM	Virtual	N/A
24-25 June 2021	2nd Meeting of FG-AI4NDM	Virtual	N/A
30 August-2 September 2021	3rd Meeting of FG-AI4NDM	Virtual	N/A
20 October 2021	4th Meeting of FG-AI4NDM	Virtual	N/A
26-28 January 2022	5th Meeting of FG-AI4NDM	Virtual	N/A
7-9 June 2022	6th Meeting of FG-AI4NDM	Geneva, Switzerland	WMO
25-26 October 2022	7th Meeting of FG-AI4NDM	Athens, Greece	General Secretariat of Telecommunications and Posts of the Ministry of Digital Governance, Hellenic Republic
19 December 2022	8th Meeting of FG-AI4NDM	Virtual	N/A
13-16 February 2023	9th Meeting of FG-AI4NDM	Virtual	N/A
27 June 2023	10th Meeting of FG-AI4NDM	Virtual	N/A
22 November 2023	11th Meeting of FG-AI4NDM	Virtual	N/A
14-15 March 2024	12th Meeting of FG-AI4NDM	Catonsville, United States	NASA's Goddard Earth Systems and Technology Center (GESTAR II) and the University of Maryland, Baltimore County (UMBC)

Figure 14: Overview of Workshop Participation



2. Complete List of FG-AI4NDM Related Workshops and Webinars

Table 2: List of FG-AI4NDM related events

Date	Title of Event	Location	Partners
13 October 2020	How can Artificial Intelligence reduce disaster risks in countries?	Online	UNEP
21 January 2021	Towards responsible AI for disaster risk management	Online	UNEP
15 March 2021	First ITU/WMO Workshop on "AI for Natural Disaster Management"	Online	WMO
23 June 2021	Second ITU/WMO/UNEP Workshop on "AI for Natural Disaster Management"	Online	WMO and UNEP
30 August 2021	Third ITU/WMO/UNEP Workshop on "Artificial Intelligence for Natural Disaster Management"	Online	WMO and UNEP
23 September 2021	AI-powered decision making for disaster recovery	Online	UNEP
30 November 2021	Robots saving lives in disaster-hit areas	Online	N/A
16 March 2022	Artificial Intelligence for Natural Disaster Management	Online	WMO and UNEP
24 October 2022	Fourth ITU /WMO/UNEP Workshop on "Artificial Intelligence for Natural Disaster Management"	Athens, Greece	WMO and UNEP [Collocated with the 6th Meeting of FG-AI4NDM]
19 April 2023	Fighting wildfires with AI-powered insights	Online	Orora Technologies, KTH Institute

Table 2: List of FG-AI4NDM related events (continued)

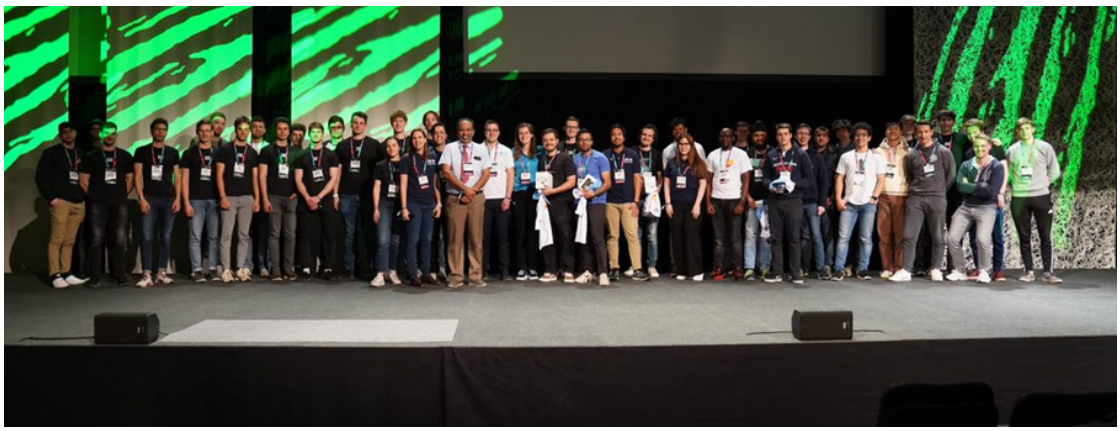
Date	Title of Event	Location	Partners
13 October 2023	Disaster risk reduction in the digital transformation age: Leveraging emerging technologies	Online	WMO and UNCCD
13 March 2024	ITU/WMO/UNEP Workshop on "Resilience to Natural Hazards through AI Solutions"	Catonsville, United States	WMO and UNEP [Collocated with the 12th of FG-AI4NDM Meeting]

3. Hackathons organized by FG-AI4NDM

FG-AI4NDM organized two hackathons:

- START Summit, St. Gallen, Switzerland (23-25 March 2022): The hackathon organized during the START SUMMIT had 300 participants, of which 41 programmers attempted to tackle landslide identification (See Figure 15).
- ZINDI: The online hackathon organized on the ZINDI platform on landslide prevention and management was open from 15 August to 30 September 2022. This hackathon drew over 500 participants.

Figure 15: Participants at the START SUMMIT Hackathon (2022)



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